

# PATENT ABSTRACTS OF JAPAN

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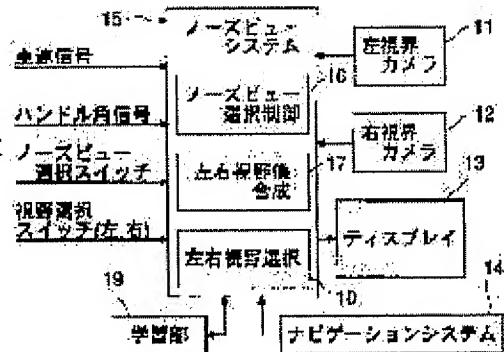
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## (54) VEHICLE USE SURROUNDING VISUAL RECOGNITION DEVICE

### (57) Abstract:

**PROBLEM TO BE SOLVED:** To provide a vehicle use surrounding visual recognition device of a simple configuration by which an image in a visual field of a vehicle side in a direction corresponding to an approaching angle to a crossing or the like is surely obtained.

**SOLUTION:** This device is provided with cameras 11, 12 that pick up visual fields of the left and right sides of a vehicle respectively and a visual field setting means that sets a direction of a noteworthy visual field in the visual field of the left and right sides by the cameras 11, 12. The device extracts partially an image of the noteworthy visual field in a set direction from each visual field image and arranges the images of the noteworthy visual fields to form one display image and to display the image on a display device 13. The visual field setting means especially sets variably a direction of the noteworthy visual field according to an instruction from a selector switch operated manually or sets the direction of the noteworthy visual field according to approaching angle information of the vehicle to a crossing indicated by navigation information, according to a steering wheel angle information of the vehicle or the like.



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## CLAIMS

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### [Claim(s)]

[Claim 1]A peripheral vision private seal device for vehicles characterized by comprising the following.

An imaging means which is attached to anterior part or the rear of vehicles, and picturizes a predetermined field of view in right and left sides of these vehicles, respectively.

A visual field setting means which sets up direction of an attention field area in each field of view of said right and left sides picturized in this imaging means, respectively.

An image compositing means which extracts a picture of an attention field area of direction set up in said visual field setting means out of each view image picturized in said imaging means, respectively, puts a picture of these attention field areas in order, and forms a display image of one sheet.

A displaying means which is provided in the interior of a room of said vehicles, and displays said display image.

[Claim 2]The peripheral vision private seal device for vehicles according to claim 1, wherein said visual field setting means was provided with a selecting switch by which manual operation is carried out and is provided with a means which carries out variable setting out of the direction of an attention field area in each view image of said right and left sides in response to operation of this selecting switch.

[Claim 3]The peripheral vision private seal device for vehicles according to claim 1, wherein said visual field setting means was provided with an environment detecting means which detects running environment of vehicles and is provided with a means to set up direction of an attention field area in a view image of said right and left sides according to information searched for by this environment detecting means.

[Claim 4]The peripheral vision private seal device for vehicles according to claim 3 which is what searches for angle-of-approach information on vehicles to a crossing where said environment detecting means is shown by navigation information.

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[Translation done.]

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Field of the Invention] This invention is carried in the anterior part or the rear of vehicles, picturizes the field of view of the right and left sides of these vehicles, and relates to the peripheral vision private seal device for vehicles which shows a driver the view image of right and left sides.

#### [0002]

[A related background art] Recently, the field of view of the right and left sides in the anterior part or the rear of these vehicles is picturized with the camera carried in the anterior part or the rear of vehicles, and development of the peripheral vision private seal device for vehicles which displays the picture using the display formed in the interior of a room of these vehicles is furthered. As shown, for example in drawing 5 according to this kind of device, when the vehicles 1 advance into a crossing from an alley etc., Since it can check from the picture acquired directly from the driver interrupted by the wall 2 grade of road (alley) both sides with the camera in which the right-and-left field of view of the vehicle front which cannot be seen was established by the anterior part of these vehicles, The effect of being able to improve the safety at the time of the penetration to the crossing is done so.

#### [0003]

[Problem(s) to be Solved by the Invention] By the way, as for the camera built into this kind of peripheral vision private seal device for vehicles, direction of that field of view is usually defined uniquely. As shown, for example in drawing 6, when the degree of angle of approach of the vehicles 1 to a crossing leans greatly for this reason, there is a possibility that the picture of the direction made into the check purpose may no longer be acquired. Since the both-the-right-and-left-ends part of the above-mentioned front grille will generally interrupt the rearward visibility of a camera when especially a camera makes the transverse-plane center section of the front grille of vehicles project and is formed, there is a problem referred to as that the picture of the slanting back which is made into the check purpose, and which it turned to, especially was seen from the vehicle front part is hard to be acquired.

[0004]In order to change direction of the field of view of the image pick-up with a camera incidentally, the movable mechanism for changing into a machinery point the direction in which a camera carries out a view, for example is needed, and the composition is complicated. On the other hand, the angle of visibility of a camera is greatly set to not less than 90 degrees, and the large field of view of the vehicles side is beforehand secured so that it may be indicated by JP,7-192200,A, for example, and it considers displaying only the picture of the particular part in this inputted image. However, if the picture of such a large angle of visibility is inputted, it cannot deny producing a big distortion in the periphery of the inputted image, especially an imaging range on either side. Therefore, when starting especially the picture of the periphery when extracting and displaying a picture selectively out of an inputted image, and displaying, it will become large-scale [ the composition ] that a distortion correction device is needed for obtaining a comfortable natural display image etc.

[0005]This invention was made in consideration of such a situation, and the purpose is to provide the peripheral vision private seal device for vehicles of easy composition of that the picture of the vehicles side of the direction according to the degree of angle of approach to the crossing, etc. can be acquired exactly.

[0006]

[Means for Solving the Problem]This invention is characterized by a vehicle circumference visual recognition device comprising the following in order to attain the purpose mentioned above. An imaging means which picturizes a view which is attached to anterior part or the rear of vehicles, and is equivalent to [ the less than 90-degree predetermined field of view in right and left sides of these vehicles ], for example, angle of visibility, natural viewing, respectively.

A visual field setting means which sets up direction of an attention field area in each field of view of said right and left sides picturized in this imaging means which should be observed especially, respectively.

An image compositing means which extracts selectively a picture of an attention field area of direction set up in said visual field setting means out of each view image picturized in said imaging means, respectively, puts a picture of these attention field areas in order, and forms a display image of one sheet.

A displaying means which is provided in the interior of a room of said vehicles, and displays said display image.

[0007]It is characterized by forming a means which carries out variable setting out of the direction of an attention field area in each view image of said right and left sides in response to operation of a selecting switch by which manual operation is carried out to said visual field setting means so that it may indicate especially to claim 2, Information on running environment of vehicles detected by an environment detecting means by said visual field setting means so that it may indicate to claim 3, For example, it is characterized by forming a means to set up direction of an attention field area in a view image of said right and left sides according to angle-of-approach information on vehicles to a crossing, wheel angle information on vehicles, etc. which are shown by navigation

information.

[0008]Namely, a vehicle circumference visual recognition device concerning this invention sets up direction of a field area which should be observed according to running environment of vehicles, such as an angle of approach to a crossing, Out of each view image in right and left sides of vehicles picturized in an imaging means (camera). It is characterized by extracting selectively an attention view image of direction of the above-mentioned field area, respectively, putting in order each attention view image of these right and left sides, forming a display image of one sheet, and making it display on a displaying means (display).

[0009]Especially direction of said field area by operation of a selecting switch by which manual operation is carried out by or a thing done for variable setting out according to running environment shown by navigation information, such as angle-of-approach information on vehicles to a crossing, and wheel angle information on vehicles. Even if it is a case as an angle of approach of vehicles to a crossing has inclination, it enables it to acquire certainly a side picture of direction considered as a request.

[0010]

[Embodiment of the Invention]Hereafter, a nose view device is explained to an example for the peripheral vision private seal device for vehicles applied to one embodiment of this invention with reference to drawings. Although the nose view device which picturizes the field of view of the right and left sides of these vehicles with the camera formed in the anterior part of vehicles here is explained to an example, it is applicable also like the vehicles back right-and-left view device which picturizes the field of view of the right and left sides of these vehicles with the camera formed in the rear of vehicles.

[0011]Drawing 1 is a figure showing the functional outline composition of a nose view device, and 11 and 12 are the left field-of-view cameras and right field-of-view cameras as an imaging means which are attached to the anterior part of vehicles and picturize the field of view of the right and left sides of these vehicles, respectively. Especially each of these cameras 11 and 12 are built into the front side of the front fender of vehicles by the slitting portion on the extension wire of a front bumper, etc., for example, and as each cameras 11 and 12 show to drawing 2, the field of view of the anterior part right and left sides of the vehicles 10 is being picturized, respectively.

[0012]The imaging visual field angles floor line and FR of each of these cameras 11 and 12 are set, for example as the range of natural viewing (view which human being can recognize visually in the natural state) of less than 90 degrees of horizontal directions, and are defined as an angle of visibility which is equivalent to a standard lens from what is called a wide-angle lens. That is, the angles of visibility floor line and FR of each cameras 11 and 12 are defined as an angle of visibility which bundles up and can picturize the field of view of the right and left sides in the anterior part of the vehicles 10 without producing most geometric distortion about the line of sight (horizontal).

[0013]On the other hand, especially, it is included in an instrument panel, a console panel, etc. ahead of a driver's seat, and the display 13 as a displaying means of a picture consists [ the interior of a room of the vehicles 10, and ] of liquid crystal displays, for example. The display of the view image of the right and left sides mentioned above is presented with this display 13, and it is

used for presenting etc. of the navigation information (map information etc. which shows a road, a self-vehicle position, etc. around a self-vehicle) by the navigation system 14 mentioned later.

[0014]Now, in the nose view system 15 by which the place by which this device is characterized is built by the microprocessor etc., It is the point especially provided with the nose view selection-control function 16, the right-and-left visual field image synthesis function 17, and the right-and-left view function preselection capability 18, and also is in the point provided with the learning part 19 as an ancillary function. The above-mentioned nose view selection-control function 16 is a function which controls whether image display based on the view images VL and VR of the anterior part right and left sides of the vehicles 10 by which an image pick-up input is carried out is performed using said display 13 with the cameras 11 and 12 mentioned above, Based on a vehicle speed signal, the directions information from a nose view selecting switch, etc., the selection control is performed so that it may mention later. The right-and-left visual field image synthesis function 17 from the view images VL and VR of the anterior part right and left sides of the vehicles 10 by which the image pick-up input was carried out with said cameras 11 and 12. The display image D of one sheet which displays the attention view images DL and DR cut down, respectively so that it might mention later on said display 13 side by side is formed. Said right-and-left view function preselection capability 18 bears the role which carries out selection setting of the field of the attention view images DL and DR selectively cut down from the view images VL and VR of the above-mentioned anterior part right and left sides, and performs control of the field setting out, for example according to the directions information from a wheel angle signal or a view selecting switch.

[0015]Said learning part 19 learns the gestalt (operating state) of each above-mentioned functions 16 and 17 and an operation of 18 according to the running environment etc. which can be acquired, for example from the navigation system 14. It is learned with what kind of gestalt use, situations of use, etc. of the nose view function in a specific crossing (gestalt) are collected as hysteresis information by this learning part 19, for example, and a nose view function is used at which crossing. This learning result is used for the automatic control of each of said functions 16, 17, and 18 in said subsequent nose view system 15.

[0016]When the operation is explained in more detail to be a function of the peripheral vision private seal device for vehicles (nose view device) built in this way according to the fundamental flows of control shown in drawing 3, nose view processing, It is started from judging whether the nose view selecting switch is chosen fundamentally (one) [Step S1]. When a nose view selecting switch is non selection (OFF), this processing is stopped, or flows of control in particular are not shown until this nose view selecting switch is chosen (one), but nose view control is performed based on the learning result by said learning part 19. The nose view control based on this learning result is mentioned later.

[0017]When a deer is carried out and the nose view selecting switch is chosen (one), based on a vehicle speed signal, it is judged next whether the vehicle speed at that time is a low speed of 20 km/h or less [Step S2]. The operating environments which need a nose view are times of carrying out low speed running, such as the time of the penetration to the bad crossing of a prospect, for

example, and this judgment is based on the check of the right-and-left field of view of a vehicle front part being almost needlessness at the time of high speed operation. If it puts in another way, when the right-and-left field of view of a vehicle front part needs to be checked, naturally it slows down and is based on it being in low speed running or the halted state. Therefore, when the vehicles 10 are carrying out high speed operation, nose view processing is stopped.

[0018]The selection control to the operation of the nose view function by such an on-off judgment of a nose view selecting switch and vehicle speed judging is performed with said nose view selection-control function 16. And if a necessary condition when operating a nose view function with this nose view selection-control function 16 is judged, it will be judged whether next the view selecting switch is chosen (one) [Step S3].

[0019]The view selecting switch is formed, for example corresponding to each of the left field of view and the right field of view, and the above-mentioned decision processing [Step S3] judges with change of the direction of an attention view to each field of view of right and left sides being directed, when one of these is chosen at least. If there is a view selecting switch of non selection (OFF), it will be judged with there being no exceptional changing instruction to direction of an attention view. Such a decision result is given to said right-and-left view function preselection capability 18.

[0020]The right-and-left view function preselection capability 18 carries out change setting out of the direction AL and AR of the attention view in each fields of view floor line and FR of right and left sides according to the directions, when such a decision result is obtained and the changing instruction of the attention view is given [step S4]. And the part images DL and DR of the specified visual field angles PL and PR on the basis of for [ AL and AR ] the above are selectively extracted, respectively out of the view images DL and DR of said anterior part right and left sides.

[0021]When the changing instruction of the attention view is not given, For example, according to the direction AL and AR of the attention view defined as a default value, Or the direction AL and AR of the attention view set up according to a wheel angle. Or the field of the part images DL and DR of the specified visual field angles PL and PR is pinpointed in order to carry out selection extraction according to the direction AL and AR of the attention view set up according to the degree of angle of approach to the crossing shown by navigation information out of the view images VL and VR of said right and left sides [Step S5]. And the part images DL and DR of the direction AL and AR of the above-mentioned attention view are extracted, respectively out of each view images VL and VR of the right and left sides by which an image pick-up input is carried out with said cameras 11 and 12.

[0022]The right-and-left visual field image synthesis function 17 lines up side-by-side the part images DL and DR called for out of each view images VL and VR of right and left sides, as mentioned above, and it forms the display image D of one sheet. This display image D is given to said display 13, image display is made, and a driver is shown. Alternative extraction of the part images DL and DR out of the view images VL and VR of the right and left sides mentioned above, If it explains now somewhat in detail about composition of the extracted part images DL and DR, This processing out of the view images VL and VR of the right and left sides shown by the fields of

view floor line and FR by which the image pick-up input was carried out with the cameras 11 and 12 as shown in drawing 4. It realizes by extracting selectively the direction AL and AR of an attention view and the picture of the field pinpointed with the angles of visibility PL and PR as the part images DL and DR.

[0023]It is set up according to the degree of angle of approach to the crossing which a deer is carried out, variable setting out of the direction AL and AR of an attention view is carried out by operation of a view selecting switch as mentioned above, and is shown by a wheel angle or navigation information. Thus, the picture of the predetermined angles of visibility PL and PR defined on the basis of the direction AL and AR when the direction AL and AR of an attention view is set up, It is equivalent to the part images DL and DR at the time of making the position of the imaging range of the specified width (equivalent to the angles of visibility PL and PR) in the view images VL and VR of the right and left sides shown by said fields of view floor line and FR slide to right and left exactly according to the direction AL and AR of an attention view.

[0024]Then, the nose view device concerning this embodiment, Out of the view images VL and VR of the right and left sides by which an image pick-up input is carried out fixed with the cameras 11 and 12. As mentioned above, according to the direction AL and AR of the attention view set up, the part images DL and DR are extracted selectively, the display image D of one sheet is formed by putting these part images DL and DR in order, and this is expressed as the display 13.

[0025]Therefore, according to this device, as shown in drawing 6 mentioned above, even if it is a case where the degree of angle of approach of the vehicles 10 to a crossing leans, the picture of the vehicles side of the direction according to the degree of angle of approach can be acquired. And the pictures DL and DR of the line of sight considered as the request of the vehicles side can be acquired, without changing direction of the field of view of the camera 11 and 12 the very thing. Therefore, the mechanism part for changing direction of the view of the cameras 11 and 12, etc. are completely unnecessary, and since what is necessary is just to attach the cameras 11 and 12 to the front fender etc. fixed as mentioned above, large simplification of the composition can be attained.

[0026]Even if it faces extracting selectively the part images DL and DR according to the direction AL and AR of an attention view out of the view images VL and VR of right and left sides, Since said view image VL and VR itself do not have almost distortion about the line of sight (horizontal), It is unnecessary to perform distortion correction according to the logging position of the part images DL and DR, and natural gender is high only by only cutting down the part images DL and DR of predetermined width out of the view images VL and VR, that is, a comfortable vehicles side picture can be acquired. Therefore, status tracking of the right and left sides in the vehicle front part from the vehicles side picture shown with the part images DL and DR can be made easy. Since a setting variation can be easily carried out by the manual operation of a view selecting switch especially about the direction AL and AR of an attention view, The right-and-left-sides picture of the optimal direction according to various road environment can be acquired easily, and a big effect is done so when confirming simply and exactly the safety of the right and left sides in a crossing etc.

[0027]As mentioned above, even if it is a case where said view selecting switch is not operated (one), the direction AL and AR of an attention view is set up, for example according to a wheel angle. when it is alike, it sets by the case where it is incidentally at the penetration time to a crossing, and the situation of the side of the vehicles 10 needs to be checked and the wheel is already turned, Since direction of the vehicles 10 leans to the direction of the road in many cases, if the direction AL and AR of an attention view is amended according to the wheel angle, it will become possible to acquire the picture of the vehicles side more exactly.

[0028]In this device, the direction AL and AR of an attention view can be set up now based on navigation information. Therefore, since direction of the vehicles side can be specified that it should check at the crossing concerned by this if the crossing into which vehicles tend to advance, for example by navigation information, and the degree of angle of approach to the crossing are shown, What is necessary is just to set up the direction AL and AR of said attention view based on this information. That the crossing pinpointed by navigation information is a crossing where the side check of the direction AL and AR of the attention view that it is specific in the past was set up and carried out, When shown as a learning result in said learning part 19, it may be made to set up the direction AL and AR of said attention view automatically according to the learning result.

[0029]Therefore, since the picture of the vehicles side of the direction according to that situation can be acquired as a high picture of the natural gender which does not have distortion simple moreover at the time of the penetration to various crossings according to the nose view device concerning this embodiment, The situation of the vehicles side can be caught exactly, and a great effect is done so when securing safe running. This invention is not limited to the embodiment mentioned above. For example, it is inclusion about a camera to quarter panel outer \*\* of a vehicle rear. It picturizes to Mr. right-and-left-sides field-of-view \*\*\*\* in a vehicle rear, and may be made to carry out image display. Make it setting out of the direction AL of an attention view to the left field of view interlocked with, and set up direction AR of an attention view to the right field of view, or, Or although the direction AL and AR of an attention view is interlocked mutually and it may be made to set it up by the reverse relation, it may be made to set up the direction AL and AR of an attention view to each field of view on either side mutually-independent. It is preferred to give priority to operation of a view selecting switch, and to perform the setting-out control about setting out of the direction AL and AR of an attention view. In addition, in the range which does not deviate from the gist, this invention can change variously and can be carried out.

[0030]

[Effect of the Invention]As explained above, according to this invention, picturize the predetermined field of view in the right and left sides of these vehicles with the camera attached to the anterior part or the rear of vehicles, respectively, and. He is trying to set up direction of the attention field area in each field of view of said right and left sides picturized with the above-mentioned camera in a visual field setting means. And the picture of the attention field area of the direction set up in said visual field setting means is extracted out of each view image picturized with said camera, respectively, the picture of these attention field areas is put in order, the display image of one sheet is formed, and it is displaying in the displaying means in which this was provided in the

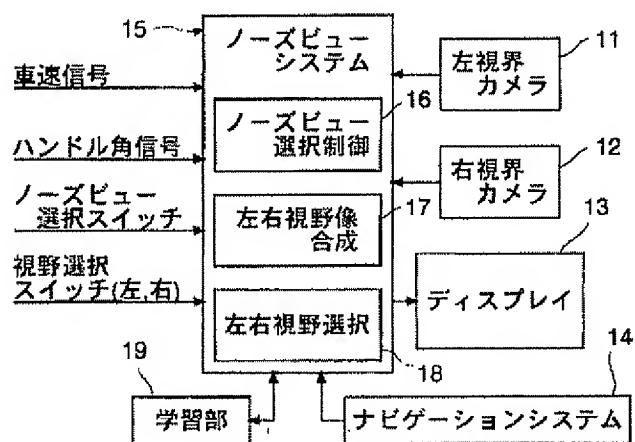
interior of a room of vehicles.

[0031]Therefore, according to this invention, without changing direction of the view of the camera itself, the side picture of the attention view of the direction considered as a request is acquired, and this can be compounded in the picture of one sheet and it can indicate by package. Therefore, it can simplify, the situation of the vehicles side to need can be checked exactly, and a great effect is done so on checking safety. Especially in a visual field setting means, variable setting out of the direction of the attention field area in each view image is carried out according to the directions information from the selecting switch by which manual operation is carried out, Since direction of an attention field area is set up according to the running environment of the vehicles detected by an environment detecting means, the effect of being able to acquire certainly the picture of the vehicles side of the direction according to running environment is done so.

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[Translation done.]

Drawing selection Representative drawing



[Translation done.]